

Efficacy Documentation Summary

Regarding Oil Spill Response Agent *Oil Spill Eater II*--Listed on EPA NCP Product Schedule as number B53 *Bioremediation Agent Enzyme Additive [EA] Category*

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The following documentation summary is based on LAEO and other expert's examination of EPA/NETAC & other credible efficacy and toxicity test reports, trials and long term records showing successful field applications of Oil Spill Eater II (OSE II).

Since 1989, per reports from OSEI Corporation as well as independent testimony from oil spill response professionals, ***Oil Spill Eater II***™ (OSE II) an Enzyme Additive Category Bioremediation oil spill response agent (a sole sourced product as of the date of this writing), has successfully cleaned up more than 27,000 hydrocarbon based spills. According to recent reports we examined, which included lab results, video and digital images, several major spills in the past year have been addressed using OSE II to excellent results. One such spill that occurred in Nov 2013 (over a 150,000 gallon spill in open ocean which traveled through miles of river waterways and sensitive habitats including mangroves), was completely remedied and removed from the water and shorelines using OSE II with virtually no damage to natural resources.

OSE II is distributed in more than 40 Countries, is listed on the US EPA's National Contingency Plan for Oil Spills (NCP Product Schedule) as well as listed in the U.S. Defense Logistics supply chain and the Navy DENIX system as BAA Book 18 number 14. (US Military have placed thousands of OSE II orders since 1992 <http://osei.us/defenseletter.pdf>) It is also listed and authorized for use in 17 other countries.

OSE II has undergone extensive efficacy and toxicity testing by EPA/NETAC and other credible institutions since 1989.

In 2009, OSE II underwent a new set of efficacy testing based on EPA prescribed protocols with complete analysis done by LSU. A copy of the complete report is attached. (*Bio Aquatic Lab NCP Complete Testing*). This US EPA NCP test is

summarized on the EPA website (see link <http://www.epa.gov/emergencies/content/ncp/products/oseater.htm>). The test was conducted with a control and an EPA prescribed Nutrient and OSE II. It measured across the full spectrum of 54 analytes to determine remediation and mass reductions. In summary, OSE II performed very well, reducing 89.9% of Alaska North Slope Crude within 28 days. These tests substantiate with certainty that OSE II effectively converts oil to CO₂ and water.

Please find further efficacy documentation in the attached PDF titled: *OSE II Efficacy Documentation*. This information unequivocally shows in lab conditions that OSE II effectively remediates across the full spectrum of hydrocarbons at an 85-99% reduction rate with no toxicity concerns. (Note: Since many of these tests were conducted under EPA supervision or participation, we ask that your archives be consulted for any further information or questions you have about these tests; this particularly so since it is likely you have the most complete records which we are presuming have been preserved.

In 2010 during the Deepwater Horizon/BP Spill, dozens of experts and qualified scientists tested and/or examined the efficacy of OSE II including a team under Governor Jindal's fast track committee consisting of an Academic Advisory Panel led by the Office of Coastal Protection and Restoration—over 12 members of this panel reported that OSE II had merit. Further, an LSU team of six experts at the request of LA DEQ reviewed OSE II as well as teams from Mississippi and Alabama DEQ's resulting in official requests from numerous officials made for its use on the BP Spill. Further, Bruce Freeman with a team from Alabama Department of Environmental Management (ADEM) examined OSE II and Mr. Freeman even called the Navy to verify the '*military use claims*' made by OSEI Corporation which did prove out with a response from a naval official indicating OSE II is stored on naval vessels and they use it in their bilges. (OSEI Corporation receives U.S. military orders routinely of which invoices/documentation are available upon request.) Finally, the BP Bio Chem Strike Force Team comprised of scores of experts from BP, USCG, OSPR in California and Academics assessed OSE II showing it had significant efficacy having made it through all tiers of testing proving that it could remediate oil as well as Corexit mixed with oil. Correspondence between Mr. Pedigo and Dr. Tsao of BP's BioChem Strike Force Team (BCST) substantiating that OSE II passed all tiers can be made available.

Toxicity Testing:

Western Florida University under contract from US EPA Hap Prichard in Gulf Breeze, Florida did simulated open water testing with OSE II on oil, measuring its efficacy and showed no acute or chronic toxicity; the 7 day toxicity test was above 2500. OSE II

made it through three individual tier reviews by the 31 Scientist panel and moved onto Tier IV. See report at: <http://www.nbiap.vt.edu/brarg/brasym95/kavanaugh95.htm> and links below.

More than 20 credible [toxicity tests](#)ⁱ have been performed on OSE II validating this product as virtually non-toxic. The following chart using EPA and Environmental Canada numbers illustrates this pretty clearly:

LC 50 TOXICITY VALUES (Environment Canada Tests)					US EPA Tests	US EPA Tests
Species	Oncorhynchus mykiss	Photobacterium phosphoreum	Gasterosteus aculeatus	Daphnia magna	Menidia (silver side fish)	Mysidopsis (shrimp)
Corexit 9500	354 (96hr)	0.065 (highly toxic)	not listed	not listed	25.2 (96hr)	32.23 (48hr)
Corexit 9527	108 (96hr)		103 (96hr)	42 (48hr)	14.57 (96hr)	24.14 (48hr)
OSE II	10,000 (96hr)	5109 (IC 50) (30 mins)		10000 (48hr)	8839 (96hr)	6698 (48hr)
LC 50=Lethal Concentration values in parts per million measuring level in which there is mortality with 50% of species being tested over a specific period of time. Higher # = less toxic, lower # = greater toxicity in ppm						
Sample Toxicity Comparison, Environment Canada and US EPA Tests, Bioremediation Vs. Corexits						
See Reference number 34						

Other Countries:

OSE II has also been lab and field tested, certified and officially registered/listed by government regulators in 17 other countriesⁱⁱ including in the middle east under MEMAC within the ROPME Region and just recently by the Australian Maritime Safety Authority who conducted extensive efficacy and toxicity testing. See listing and test information at: (<http://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/control-agents/list/>)

OSE II can be safely and cost effectively used in any type of environment on oil spills and virtually any hydrocarbon based material including PCBs, wastewater treatment, groundwater contamination sites, harbors, airports, refineries and any oil or fuel spill prone location or storage facility. It is also safe and non-toxic in sensitive habitats such as salt water marshes, fresh water environments, ocean and marine eco systems, rivers, inlets, public beaches etc.

LINKS TO OTHER EFFICACY & TOXICITY TESTS

SUMMARIES

OSE II can be used on the surface, below the surface, on the ocean floor, in marshes, estuaries, and sand or soil, beaches on rocks, in bays, ports and harbors. Ample case studies in the field are available to prove it's workability in all mediums. OSE II is virtually non-toxic and extremely effective in breaking down oil and fuels. Samplings of OSE II toxicity tests are listed below and more can be found in OSEI Corps Technical Library OSEI Corporation's [Technical Library](#).

(To view documentation and actual test reports, click the blue links below or see attached.)

Salt Water Efficacy Tests:

- U.S. EPA / NETAC 21 Day & 28 Day Bioremediation Test - Biodegraded Alaskan Crude 98% in 21/28 days. (pg 25-35)
- U.S. Respirability Test – EPA determined OSE II to reduce hydrocarbons by 98% and aromatics by 85% which was better than any other product tested. (pg 41-44)
- University of Alaska (Dr. Brown) PAH Test – Demonstrates that OSE II with mineral nutrients and hydrocarbons is **300%** more effective than without OSE II. (pg 45-49)
- Mega Borg Ship Spill in Gulf (South African Crude Oil) Test – In 216 hours OSE II lowered TPH from 100,070 ppm to 516 ppm for a 99.5% reduction. (pg 50-52)
- BETX Bioremediation Test- OSE II can even work well on Benzene, Ethyl Benzene, Toluene and Xylene ratios demonstrate the potential to biodegrade as much as 98%. (pg 53-56)

Fresh Water Efficacy Tests:

- Chevron Crude Oil Bioremediation Test- OSEII on Chevron Crude in 24 days reduced 95,200 ppm to 690 ppm or 99.8% effective on biodegrading this oil.

Soil Efficacy Tests:

- U.S. Marine Corps Base 29 Palms California (Cleanup Won Environmental Award)
(pg 1-5)

Salt Water Species Marine Toxicity Tests

- U.S. EPA / NETAC Mysid Toxicity Test (this test was run twice) – LC50 Test, at 96 hours OSE II greater than 2100 mg/L.
- Both Mummichog and Artemia Salina Toxicity Test – LC50 Test, at 48 hours OSE II is 5285 mg/L. (pg 14-23)
- EPA/NETAC testing performed by University of Western Florida under contract from US EPA Hap Prichard performed toxicity testing with OSE II where in a simulated open water test OSE II was applied to oil and the effluent was tested on two different species and the average LC 60 was above 5000 showing OSE II is virtually non-toxic. The test also measured the degradation of the oil showing significant remediation.
- Toxicity testing from the above open water mesocosim effluent as well as toxicity testing the US EPA, Environmental Canada, South Korean and other foreign agencies have conducted prove OSE II is non-toxic to salt and fresh water species.

Fresh Water Species Marine Toxicity Tests:

- Rainbow Trout Toxicity Test by Environment Canada-Toxicity tests state 1000 mg/L or less is toxic. Anything higher is acceptable and considered non-toxic. OSE II, test result 10,000 mg/L = non-toxic.

Beneficial Environment Effects:

- Biological Oxygen Demand for OSE II –OSE II has minimal impact on BOD, less than 7%.
- Dispersant Swirling Flask Test - Proves OSE II causes oil to float

Compiled by Lawrence Anthony Earth Organization
Science and Technology Committee

ⁱ <http://osei.us/wp-content/uploads/18-Toxicity-test-with-4-2012-Log0.pdf>

Note, this document summarizes toxicity tests done on OSE II. The complete reports are available upon request and can be validated by contacting the 3rd party sources also. LAEO has taken the time to validate these as authentic and scientifically valid.

ⁱⁱ OSEI manufacturer has retained the right to keep the details of this information confidential to protect their business interests. Lawrence Anthony Earth Organization has examined the documentation from various countries where OSE II has been extensively used on major spills and can attest to the authenticity of the information but respect OSEI Corps request to keep this information confidential.